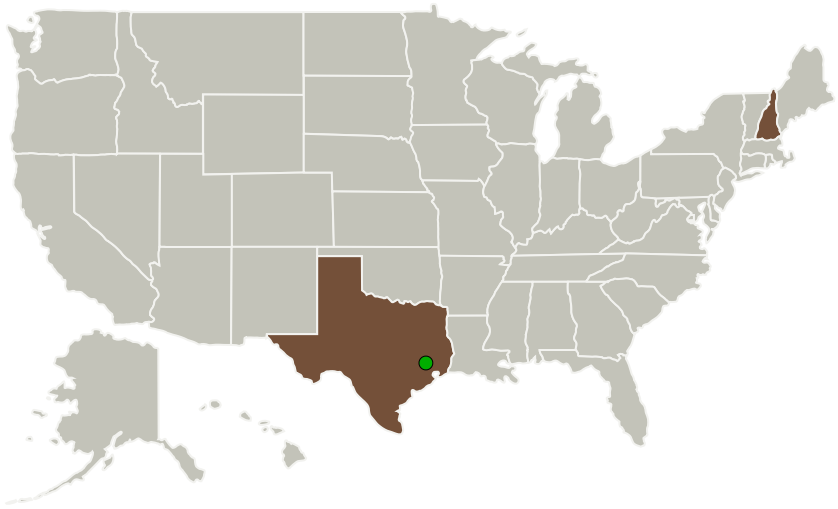
An Efficient Heat Exchanger for In Situ Resource Utilization, Phase I

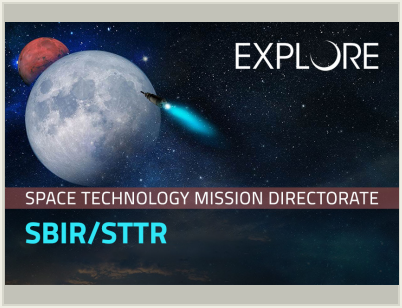
Completed Technology Project (2011 - 2011)

Project Introduction

In situ resource utilization (ISRU) is essential for several of NASA's future flagship missions. Currently envisioned ISRU plants include production of oxygen from hydrogen reduction of lunar regolith and extraction of water from Martian regolith or asteroid material. These ISRU processes require heating of the regolith to high reaction temperatures. Once the reaction is complete, most thermal energy exits the system in the spent regolith batch and is therefore wasted. Creare proposes to recover this heat and use it to preheat fresh regolith prior to entering the reactor. Our novel heat recovery design is purely passive, robust, and compact to accommodate tight mass and volume constraints. Our heat exchanger promises to recover 80% of the otherwise wasted thermal energy. This energy savings can either be used to reduce the power plant size or speed up the production rates of the ISRU system. The Creare team has firsthand knowledge of the current ISRU research status and has the necessary background in mechanical design, heat exchanger design, as well as the facilities and commercialization expertise, to make this project a success.

Primary U.S. Work Locations and Key Partners





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Organizations Performing Work	Role	Type	Location
Creare LLC	Lead Organization	Industry	Hanover, New Hampshire
Johnson Space Center(JSC)	Supporting Organization	NASA Center	Houston, Texas

Primary U.S. Work Locations	
New Hampshire	Texas

Project Transitions

February 2011: Project Start

August 2011: Closed out

Closeout Documentation:

- Final Summary Chart*(https://techport.nasa.gov/file/138000)*

Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Organization:

Creare LLC

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

Project Management

Program Director:

Jason L Kessler

Program Manager:

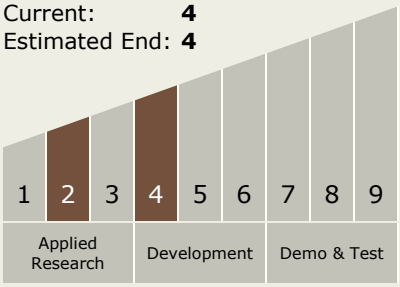
Carlos Torrez

Principal Investigator:

Paul H Sorensen

Technology Maturity (TRL)

Start: **2**
Current: **4**
Estimated End: **4**



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Technology Areas

Primary:

- TX07 Exploration Destination Systems
  - TX07.1 In-Situ Resource Utilization
    - TX07.1.3 Resource Processing for Production of Mission Consumables

Target Destinations

The Sun, Earth, The Moon, Mars, Others Inside the Solar System, Outside the Solar System